Trend Study 19B-6-07

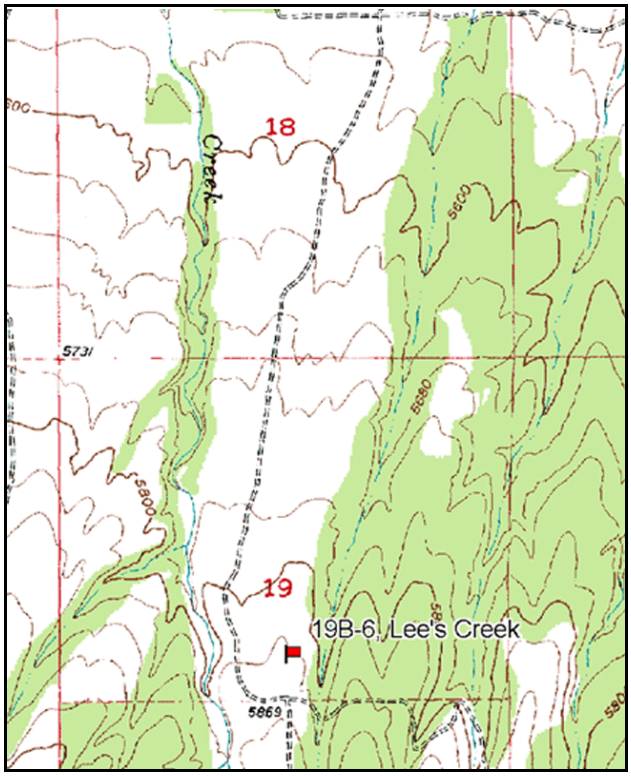
Study site name: Lee's Creek . Vegetation type: Chained, Seeded PJ .

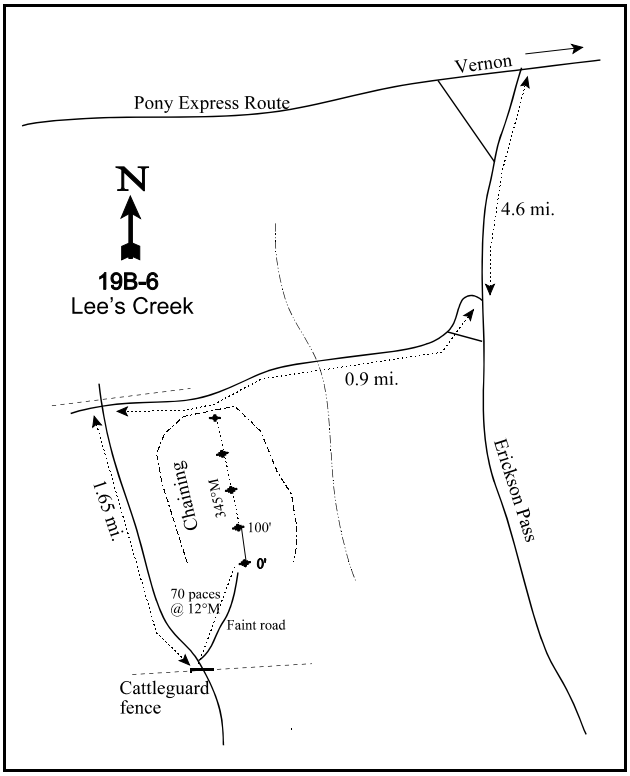
Compass bearing: frequency baseline 345 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Starting at the intersection of the Erickson Pass and Pony Express Roads, proceed south on the Erickson Pass Road for 4.60 miles to an intersection. Turn right at the intersection and proceed west for 0.9 miles to another intersection. Turn left at the intersection and proceed south for 1.65 miles to a cattle guard and gate. From the cattle guard, the 0-foot stake of the baseline, is 70 paces away at an azimuth of 12 degrees magnetic. The study runs at an azimuth of 345 degrees true. The study is located just inside the chaining that is adjacent to the burn. A red browse tag, number 3973, is attached to the 0-foot marker of the baseline.




Map Name: Indian Peaks

Diagrammatic Sketch

Township 9S , Range 7W , Section 19

GPS: NAD 83, UTM 12T 357007 E 4430991 N

## DISCUSSION

### Lee's Creek - Trend Study No. 19B-6

#### Study Information

This winter range study is located in the lower portion of the Lee's Creek drainage on an old Bureau of Land Management juniper chaining. It is situated on a ridge that runs north-south [elevation: 5,850 feet (1,783 m), slope: 5%, aspect: north]. Lee's Creek, a perennial stream, is located 900 feet (274 m) to the west. The study is located on a fairly narrow corridor of intact pinyon-juniper woodland surrounded by large areas that had been burned before 1997.. Although the juniper canopy is good thermal and visual cover, wildlife use has been low. From the pellet group transect, deer use was estimated at less than 1 day use/acre (2 ddu/ha) in 2002 and 7 days use/acre (17 ddu/ha) in 2007. Elk use was estimated at 1 day use/acre (3 edu/ha) in 2007, and rabbit use has been abundant since 1997. Use by domestic animals has been moderate. In 1997, cattle were grazing a burned area west of the study. Cattle use was estimated at 21 days use/acre (52 cdu/ha) in 2002 and 15 days use/acre (38 cdu/ha) in 2007. Nearly all of the cattle pats sampled in 2002 were from the previous grazing season. There were 2 sheep days use/acre (5 sdu/ha) in 2007.

#### Soil

The study lies within the Abela soil series, which generally consists of very deep, well-drained soils that formed in alluvium or lacustrine deposits. Soils in this series are derived mainly from limestone, sandstone, and quartzite, and are found on fan remnants and lake terraces with 2%-25% slopes (USDA-NRCS 2007). Specifically at the study, the soil texture is loam and it has a neutral reactivity (pH of 7.0). Soil phosphorous is 6.3 ppm, which is slightly above the minimum threshold (6 ppm) considered necessary for normal plant growth and development (Tiedemann and Lopez 2004). Erosion is minimal due to minimal slope and moderate vegetation and litter cover. The erosion condition was classified as stable in 2002 and 2007.

#### Browse

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the dominant browse species. Canopy cover was 7% in 2002 and increased to 11% in 2007. Sagebrush density was estimated at approximately 700 plants/acre (1,733 plants/ha) in 1983 and 1989. Beginning in 1997, a larger area was sampled to improve density estimates. The density was estimated at 2,260 plants/acre (5,594 plants/ha) in 1997, 3,260 plants/acre (8,069 plants/ha) in 2002, and 2,200 plants/acre (5,445 plants/ha) in 2007. There were 1,760 seedlings/acre (4,356 seedlings/ha) sampled in 1997, otherwise few seedlings have been sampled. Young plants were also most abundant in 1997, and comprised 72% of the population. In other sample years, young plants have comprised from 19% to 48% of the population. Decadence was highest in 1983 (14%) and in 2007 (19%), and has been less than 10% otherwise. There have been few dead or dying plants in all sample years. The proportion of plants exhibiting poor vigor has ranged from 0% to 14% of the population. In 2007, 54% of the population was infested by the sagebrush defoliator moth (*Aroga websteri*). Annual leader growth on sagebrush was 1.1 inches (2.8 cm) in 2002 and 1.9 inches (4.9 cm) in 2007. Browse use was light in 1983, 1997, and 2002, and light-moderate in 1989 and 2007.

Antelope bitterbrush (*Purshia tridentata*) is present in low numbers. The estimated density has decreased from 166 plants/acre (411 plants/ha) in 1989 to 0 plants/acre in 2007. The majority of the sampled plants were in the young and mature age class. The few bitterbrush present have a prostrate growth form. Average height measurements have been 16 inches (41 cm) or less, while average crown width has been 51 inches (130 cm) or less. Browse use was heavy from 1983 through 1997 and light in 2002 and 2007.

Point-centered quarter data indicates little change in Utah juniper (*Juniperus osteosperma*) density. Estimated juniper density has been 87-97 trees/acre (215-240 trees/ha) since 1989. However, canopy cover increased from 14% in 2002 to 17% in 2007. Other species scattered around the site include white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), pricklypear cactus (*Opuntia* sp.), and broom snakeweed

(*Gutierrezia sarothrae*). Since 2002, canopy cover of these species has been 1% or less.

Herbaceous Understory

The herbaceous understory is dominated by perennial grasses. Since 1997, the cover of perennial grasses has averaged 14%. Crested wheatgrass (*Agropyron cristatum*) and Sandberg bluegrass (*Poa secunda*) are the dominant species, accounting for 98% of the grass cover since 1997. Crested wheatgrass individuals are short and small. It was noted in 2002 that crested wheatgrass plants in the adjacent burned areas had better vigor, stature, and provided more cover compared to the plants sampled by this transect. Other perennial grasses sampled in very low frequencies are bluebunch wheatgrass (*Agropyron spicatum*), bottlebrush squirreltail (*Sitanion hystrix*), and Letterman needlegrass (*Stipa lettermani*). Cheatgrass (*Bromus tectorum*) has been measured, but in low frequencies.

Perennial forb cover decreased from 2% in 1997 to less than 1% by 2007. The few forb species present have poor forage values. The most abundant perennial forbs are rock goldenrod (*Petradoria pumila*) and Hood's phlox (*Phlox hoodii*). Pale alyssum (*Alyssum alyssoides*) and bur buttercup (*Ranunculus testiculatus*) have been the most abundant annual species. In years when these species are present, they occur at higher nested and quadrat frequencies than the perennial species. Bur buttercup is allelopathic (Buchanan et al. 1978) and may be limiting the establishment of other species.

1989 TREND ASSESSMENT

The browse trend is stable. The density of Wyoming big sagebrush remained constant. The age class distribution shifted from predominantly young to mature plants, though seedling and young plants still comprised a substantial portion of the population. Decadence decreased from 14% of the population to 9%, but the proportion of plants exhibiting poor vigor increased from 0% to 14%. Browse use shifted from light to light-moderate. The grass trend is stable. The sum of nested frequency of perennial grasses increased 8%. There was a significant increase in the nested frequency of Sandberg bluegrass and a significant decrease in bottlebrush squirreltail. The forb trend is slightly up. Even though the sum of nested frequency of perennial forbs increased 70%, they are still a small part of the vegetative component.

browse - stable (0) grass - stable (0) forb - slightly up (+1)

1997 TREND ASSESSMENT

The browse trend is up. The Wyoming big sagebrush density increased more than three-fold. This increase is due to an increase in young and mature plants included in the larger sample area. There was also a very large increase in the number of sagebrush seedlings measured. No decadent plants were sampled, and the proportion of plants exhibiting poor vigor decreased from 14% to 5%. Browse use shifted from light-moderate to light. The grass trend is stable. The sum of nested frequency of perennial grasses increased 3%. The nested frequency of Sandberg bluegrass increased significantly, but that of crested wheatgrass decreased significantly. The forb trend is slightly up. The sum of nested frequency of perennial forbs increased 37%, but forbs remained a small part of the vegetative component. The Desirable Components Index (DCI) score was fair due to the low preferred browse cover (less than 5%). The DCI score would have been lower were it not for the high perennial grass cover.

winter range condition (DCI) - fair (39) Low potential scale
browse - up (+2) grass - stable (0) forb - slightly up (+1)

2002 TREND ASSESSMENT

The browse trend is up. The Wyoming big sagebrush density increased 44%, which was due to an increase in the number of mature plants. There was a decrease in both seedling and young plant density, though young plants are still dense enough to yield good recruitment. Decadence increased from 0% of the population to 7%, and 6% of the population was classified as dying. The proportion of plants exhibiting poor vigor and

browse use both remained constant. The grass trend is stable. The sum of nested frequency of perennial grasses decreased 8%. Cheatgrass was not measured. The forb trend is slightly down. The sum of nested frequency of perennial forbs decreased 29% and only four species were measured. The decrease in the nested frequency of grasses and forbs was likely the result of a region-wide drought (Utah Climate Summaries 2007). The DCI score increased to good because sagebrush cover increased beyond a minimum threshold set at 5%.

winter range condition (DCI) - good (57) Low potential scale
browse - up (+2) grass - stable (0) forb - slightly down (-1)

2007 TREND ASSESSMENT

The browse trend is down. The density of Wyoming big sagebrush decreased 33%. Seedling density remained low, and there was a decrease in young and mature plants. Decadence increased from 7% of the population to 19%, but plants classified as dying decreased from 6% of the population to 2%. The sagebrush defoliator moth had infested 54% of the plants. Browse use shifted from light to light-moderate. The grass trend is stable. The sum of nested frequency of perennial grasses increased 7%. Grasses had already been heavily grazed before the vegetation was sampled. The forb trend is slightly down. The sum of nested frequency of perennial forbs increased 4%, which would normally result in a stable trend. However, there was a significant increase in bur buttercup, quadrat frequency was 78%. The DCI score decreased to fair due to the low preferred-browse cover (less than 5%). The DCI score would have been lower, were it not for the high perennial grass cover.

winter range condition (DCI) - fair (35) Low potential scale
browse - down (-2) grass - stable (0) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 19B, Study no: 6

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|---|---|
| | | '83 | '89 | '97 | '02 | '07 | '97 | '02 | '07 |
| G | Agropyron cristatum | b298 | b308 | a277 | a238 | a245 | 10.01 | 8.93 | 8.02 |
| G | Agropyron spicatum | b25 | - | - | a3 | a5 | - | .03 | .07 |
| G | Bromus tectorum (a) | - | - | a21 | - | a12 | .21 | - | .03 |
| G | Oryzopsis hymenoides | a1 | - | a- | - | - | .00 | - | - |
| G | Poa secunda | a94 | b165 | c215 | c213 | c241 | 4.44 | 3.03 | 6.14 |
| G | Sitanion hystrix | b28 | a8 | a2 | a4 | a- | .03 | .18 | .01 |
| G | Stipa lettermani | - | - | 1 | - | - | .03 | - | - |
| Total for Annual Grasses | | 0 | 0 | 21 | 0 | 12 | 0.20 | 0 | 0.03 |
| Total for Perennial Grasses | | 446 | 481 | 495 | 458 | 491 | 14.53 | 12.17 | 14.24 |
| Total for Grasses | | 446 | 481 | 516 | 458 | 503 | 14.74 | 12.17 | 14.28 |
| F | Alyssum alyssoides (a) | - | - | b116 | - | a41 | .25 | - | .11 |
| F | Antennaria rosea | - | - | - | a1 | b9 | - | .00 | .01 |
| F | Astragalus cibarius | - | - | - | - | 7 | - | - | .07 |
| F | Astragalus sp. | - | a1 | a8 | - | a2 | .20 | - | .01 |
| F | Astragalus utahensis | - | - | - | - | - | .00 | - | - |

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|---|---|
| | | '83 | '89 | '97 | '02 | '07 | '97 | '02 | '07 |
| F | Chaenactis douglasii | $_{a}$1 | - | $_{a}$5 | $_{a}$2 | - | .01 | .00 | - |
| F | Crepis acuminata | - | $_{a}$3 | $_{a}$4 | - | - | .01 | - | - |
| F | Descurainia pinnata (a) | - | - | - | - | 1 | - | - | .00 |
| F | Hymenoxys acaulis | - | 4 | - | - | - | - | - | - |
| F | Lactuca serriola | - | - | - | - | 5 | - | - | .01 |
| F | Microsteris gracilis (a) | - | - | 1 | - | - | .00 | - | - |
| F | Petradoria pumila | $_{a}$4 | $_{ab}$11 | $_{bc}$28 | $_{c}$30 | $_{abc}$14 | 1.33 | .76 | .40 |
| F | Phlox hoodii | $_{ab}$25 | $_{b}$29 | $_{ab}$23 | $_{ab}$17 | $_{a}$8 | .31 | .09 | .02 |
| F | Phlox longifolia | - | $_{a}$1 | $_{a}$2 | - | $_{a}$6 | .01 | - | .04 |
| F | Ranunculus testiculatus (a) | - | - | $_{a}$98 | - | $_{b}$221 | .31 | - | .84 |
| F | Townsendia incana | - | 2 | - | - | - | - | - | - |
| F | Zigadenus paniculatus | - | - | $_{a}$- | - | $_{a}$1 | .03 | - | .00 |
| Total for Annual Forbs | | 0 | 0 | 215 | 0 | 263 | 0.57 | 0 | 0.95 |
| Total for Perennial Forbs | | 30 | 51 | 70 | 50 | 52 | 1.92 | 0.86 | 0.57 |
| Total for Forbs | | 30 | 51 | 285 | 50 | 315 | 2.49 | 0.86 | 1.53 |

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 19B, Study no: 6

| Type | Species | Strip Frequency | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|
| | | '97 | '02 | '07 | '97 | '02 | '07 |
| B | Artemisia tridentata wyomingensis | 42 | 52 | 47 | 4.61 | 5.14 | 4.62 |
| B | Atriplex canescens | 0 | 1 | 0 | - | - | - |
| B | Chrysothamnus nauseosus albicaulis | 5 | 1 | 0 | .01 | - | - |
| B | Cowania mexicana stansburiana | 0 | 0 | 1 | - | - | - |
| B | Gutierrezia sarothrae | 4 | 4 | 4 | .30 | 1.23 | .03 |
| B | Juniperus osteosperma | 6 | 7 | 8 | 9.64 | 9.37 | 12.67 |
| B | Purshia tridentata | 1 | 1 | 0 | - | - | - |
| Total for Browse | | 58 | 66 | 60 | 14.57 | 15.75 | 17.32 |

CANOPY COVER, LINE INTERCEPT --
Management unit 19B, Study no: 6

| Species | Percent Cover | | |
|---|---|---|---|
| | '97 | '02 | '07 |
| Artemisia tridentata wyomingensis | - | 6.94 | 10.63 |
| Chrysothamnus nauseosus albicaulis | - | .10 | - |
| Gutierrezia sarothrae | - | .48 | .05 |
| Juniperus osteosperma | 6.00 | 14.38 | 16.75 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 19B, Study no: 6

| Species | Average leader growth (in) | |
|---|---|---|
| | '02 | '07 |
| Artemisia tridentata wyomingensis | 1.1 | 1.9 |

POINT-QUARTER TREE DATA --
Management unit 19B, Study no: 6

| Species | Trees per Acre | |
|---|---|---|
| | '02 | '07 |
| Juniperus osteosperma | 97 | 87 |

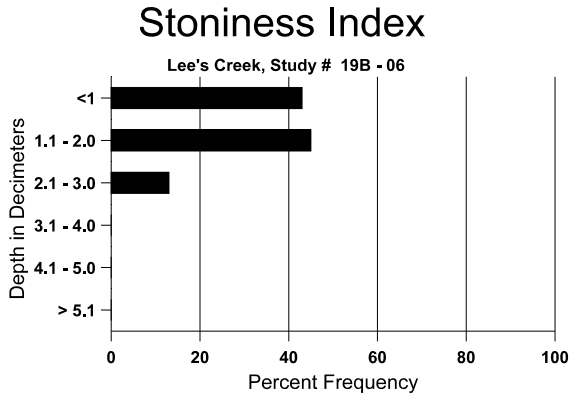
| Average diameter (in) | |
|---|---|
| '02 | '07 |
| 5.1 | 7.7 |

BASIC COVER --
Management unit 19B, Study no: 6

| Cover Type | Average Cover % | | | | |
|---|---|---|---|---|---|
| | '83 | '89 | '97 | '02 | '07 |
| Vegetation | 3.25 | 7.75 | 26.29 | 27.71 | 33.07 |
| Rock | 0 | 5.00 | 1.88 | 2.55 | 1.35 |
| Pavement | 4.50 | 11.50 | 11.55 | 23.43 | 14.53 |
| Litter | 59.75 | 36.75 | 32.06 | 31.87 | 33.57 |
| Cryptogams | 0 | 0 | 5.19 | .58 | .35 |
| Bare Ground | 32.50 | 39.00 | 24.19 | 25.08 | 34.04 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 6, Lee's Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | Loam | | | %0M | ppm P | ppm K | dS/m |
|---|---|---|---|---|---|---|---|---|---|
| | | | %sand | %silt | %clay | | | | |
| 10.2 | 62.5 (12.7) | 7.0 | 38.0 | 36.1 | 25.9 | 3.0 | 6.3 | 182.4 | .7 |




PELLET GROUP DATA --
Management unit 19B, Study no: 6

| Type | Quadrat Frequency | | |
|---|---|---|---|
| | '97 | '02 | '07 |
| Rabbit | 27 | 8 | 60 |
| Elk | - | - | 1 |
| Deer | 14 | 3 | 10 |
| Cattle | 22 | 14 | 7 |
| Sheep | - | - | - |

| Days use per acre (ha) | |
|---|---|
| '02 | '07 |
| - | - |
| - | 1 (3) |
| 1 (2) | 7 (17) |
| 21 (52) | 15 (38) |
| - | 2 (5) |

BROWSE CHARACTERISTICS --
Management unit 19B, Study no: 6

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % dying | % poor vigor | Average Height Crown (in) |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | |
| 83 | **699** | 133 | 333 | 266 | 100 | - | 5 | 0 | 14 | - | 0 | 35/36 |
| 89 | **698** | 100 | 266 | 366 | 66 | - | 38 | 0 | 9 | - | 14 | 25/27 |
| 97 | **2260** | 1760 | 1620 | 640 | - | 40 | 6 | .88 | 0 | - | 5 | 25/38 |
| 02 | **3260** | 20 | 760 | 2260 | 240 | 40 | 7 | 0 | 7 | 6 | 7 | 21/30 |
| 07 | **2200** | 20 | 420 | 1360 | 420 | 40 | 46 | 5 | 19 | 2 | 3 | 24/32 |
| Atriplex canescens | | | | | | | | | | | | |
| 83 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 89 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 97 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | **40** | - | - | 40 | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % dying | % poor vigor | Average Height Crown (in) |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | |
| 83 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 89 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 97 | **140** | 60 | 140 | - | - | - | 14 | 29 | 0 | - | 14 | -/- |
| 02 | **20** | - | - | - | 20 | 20 | 0 | 100 | 100 | - | 0 | 11/16 |
| 07 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | 9/14 |
| Cowania mexicana stansburiana | | | | | | | | | | | | |
| 83 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 89 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 97 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | **20** | - | 20 | - | - | - | 100 | 0 | - | - | 0 | -/- |
| Gutierrezia sarothrae | | | | | | | | | | | | |
| 83 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 89 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 97 | **240** | - | 40 | 200 | - | - | 0 | 0 | 0 | - | 0 | 7/10 |
| 02 | **480** | - | 20 | 280 | 180 | 40 | 0 | 0 | 38 | 13 | 13 | 7/11 |
| 07 | **140** | - | - | 60 | 80 | - | 0 | 0 | 57 | 29 | 29 | 8/10 |
| Juniperus osteosperma | | | | | | | | | | | | |
| 83 | **66** | - | - | 66 | - | - | 0 | 0 | - | - | 0 | 67/41 |
| 89 | **100** | - | - | 100 | - | - | 0 | 0 | - | - | 0 | 87/52 |
| 97 | **120** | - | - | 120 | - | 20 | 0 | 0 | - | - | 0 | -/- |
| 02 | **160** | - | - | 160 | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | **180** | - | - | 180 | - | 20 | 0 | 0 | - | - | 0 | -/- |
| Leptodactylon pungens | | | | | | | | | | | | |
| 83 | **100** | - | - | 100 | - | - | 0 | 0 | 0 | - | 0 | 8/15 |
| 89 | **198** | - | 66 | 66 | 66 | - | 0 | 0 | 33 | 33 | 33 | 6/7 |
| 97 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 02 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 07 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| Opuntia sp. | | | | | | | | | | | | |
| 83 | **33** | - | - | 33 | - | - | 0 | 0 | - | - | 0 | 6/15 |
| 89 | **33** | - | - | 33 | - | - | 0 | 0 | - | - | 0 | 6/15 |
| 97 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | 6/21 |
| 02 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | 5/18 |
| 07 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % dying | % poor vigor | Average Height Crown (in) |
| Purshia tridentata | | | | | | | | | | | | |
| 83 | **133** | - | - | 133 | - | - | 0 | 100 | 0 | - | 0 | 13/31 |
| 89 | **166** | - | - | 133 | 33 | - | 0 | 80 | 20 | 20 | 20 | 10/19 |
| 97 | **20** | - | 20 | - | - | - | 0 | 100 | 0 | - | 0 | 9/24 |
| 02 | **40** | - | 40 | - | - | - | 0 | 0 | 0 | - | 0 | 12/51 |
| 07 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | 16/49 |